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**GRASSHOPPER
CONTROL ON
RANGELAND**

JUL 14 1966

Hitting the Hot Spots





A member of the survey team, looking for infestations, uses a sweep net to get a sampling of grasshoppers in an area. ST-444-13



There are many varieties of grasshoppers in this country, and all have big appetites. The one above, along with billions of his brethren, can quickly turn rangeland into a barren desert. ST-446-12

COVER—A spray plane deposits insecticide on rangeland to stop the hungry 'hoppers infesting the grass before they move on to fresh areas. ST-445-2, ST-447-4

USDA, States, Ranchers Join To Fight an Age-Old Enemy With Modern Control Methods

For almost as long as man has planted seeds in the earth, he has had to compete with grasshoppers for the harvest. These voracious insects can level many crops as well as the grasses that livestock eat. Ironically, grasshoppers are most plentiful during periods of drought when food and forage are already scarce.

Even today, in many countries, grasshoppers threaten to bring hunger, even famine.

But not in the United States. Here, we have learned to control this pest. A combination of surveys that pinpoint potential infestations and pesticides that can be applied safely by aircraft serve to hold grasshoppers in check. Nevertheless, they continue to be a multi-million dollar problem every year in our western states. The U. S. Department of Agriculture and the States work closely with farmers and ranchers to combat this ancient enemy.

Find Them Early

The key to fighting grasshoppers is to find them and knock them out early while they are small, confined to limited places, and before they begin to move out in search of food.

All season long, workers in the Plant Pest Control Division of USDA's Agricultural Research Service keep close watch on the development of grasshoppers and map out those areas where the pests are building up to damaging proportions. The next spring, when the young grasshoppers emerge from their egg pods in the soil, these "hot spots" show up and can be sprayed.

New Treatment Developed

ARS scientists are constantly working to develop better grasshopper controls. For example, a new method of applying undiluted insecticide, developed recently by the Plant Pest Control Division, has both speeded up and cut the cost of control operations. Using undiluted malathion, aircraft can treat an acre with only a cupful of insecticide. Previously, more than a gallon of total material—pesticide and oil or water—was required per acre.

The low volume method has cut application costs by 50 percent. One plane can do the work of four planes using the old high volume method. The problem of mixing insecticides with diluting materials has been eliminated, and storage, loading, and handling problems have been greatly reduced. Malathion can be applied without removing livestock from the range. Malathion is one of the safer insecticides from the standpoint of residues and is relatively harmless to humans, livestock, and other warm-blooded animals. USDA routinely monitors all of its insect control programs for possible side affects.

Most grasshopper infestations occur on the vast rangelands of the West—areas where from 15 to 40 acres are required to graze one beef animal. Ranchers could not afford to treat these areas, even with the relatively low cost per acre of low volume applications. But a pocket of grasshoppers, if not halted, would quickly invade other rangeland. Therefore, USDA and the States share the cost of treating rangeland with the ranchers. During the past few years, around a million acres have been treated each year through this cooperative arrangement.

LOW VOLUME—The drum of undiluted malathion in the foreground will treat the same area as the twelve drums of diluted insecticide in the background. The low volume method simplifies storage, eliminates mixing, and allows planes to cover a much larger area in a single trip. ST-447-12



Planes are Readied for ar



*Planes are fueled up for the mornin.
(above). Pilots and supervisory person
ST-447-5, ST-444-7, ST-444-1*

*An ARS pilot flies above a spray pl
spray is falling. ST-447-11*



Planes are Readied for an Early Morning Attack on the Hoppers



Planes are fueled up for the morning run (left), and their spray tanks are filled with insecticide (above). Pilots and supervisory personnel go over maps locating the next target area. (above right) ST-447-5, ST-444-7, ST-444-1

An ARS pilot flies above a spray plane to check the area the plane is covering and the way the spray is falling. ST-447-11

Many types and sizes of aircraft are adapted for spraying the hot spots. Military planes, kept in tip top condition, are modified to fight in new battles as real as the ones for which they were built. The work is done by custom aerial applicators who bid on spraying jobs and carry them out closely supervised by members of ARS's Plant Pest Control Division.

The spraying operations last only a few weeks each summer. But those weeks are filled with days that begin at 4 a.m. The men begin fueling the planes and loading them with insecticide early so they can be on target by dawn, ready to release the first of the spray. The insecticide must be sprayed in the calm of early morning, when wind and temperature conditions are most favorable for controlled application. Crews stand ready at the airfield to refill the planes as soon as they land, to help crowd in as many trips as possible before conditions become unfavorable.



Methods Checked for Effectiveness

After the day's spraying is finished, ARS personnel assigned to the rangeland grasshopper control program work on into the late afternoon; many of them were on the job when plane crews reported to work before dawn. Now they must cover the areas sprayed that morning to determine the effectiveness of the application. The next day's operation must be planned. And they are constantly looking for even better ways to get the job done.

The wheel of a truck gives a quick clue to the number of 'hoppers killed. If the driver sees no insects hopping away from the front tire as he drives slowly through a recently sprayed area, he knows the insecticide has done its job. ST-446-7

Specially coated pieces of paper are placed in the path of the spray planes. These cards are picked up later and checked to see if the spray has the proper drop size and density. The spray pattern can be changed by adjustments in altitude of the spray planes and type of nozzle used. ST-444-12, ST-444-9



The real mark of success is finding dead grasshoppers in the areas where the spray has fallen. This "hot spot" has cooled off. ST-446-5



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